

59. (Amended) An article comprising:  
a substrate; and  
a layer disposed over the substrate, the layer comprising a highly tetrahedral amorphous carbon having more than about 15%  $sp^3$  carbon-carbon bonds and a single peak Raman spectrum, the layer further comprising at least one of hydrogen and nitrogen, wherein the  $sp^3$  carbon-carbon bonds are at least in part formed by directing an energized stream of carbon ions having a uniform weight and a substantially uniform impact energy toward the substrate.

*Please cancel claim 60.*

61. (Amended) An article as in claim 59, wherein the  $sp^3$  carbon-carbon bonds are at least in part formed by directing an energized stream of carbon ions toward the substrate with an ion impact energy between about 100 and 120 eV for each carbon atom.

62. (Amended) An article comprising:  
a substrate; and  
a layer disposed over the substrate, the layer comprising a highly tetrahedral amorphous carbon having more than about 15%  $sp^3$  carbon-carbon bonds and a carbon bonding pattern characterized by a single peak Raman spectrum;  
wherein a percentage of  $sp^3$  carbon-carbon bonds in the layer increases as a layer thickness decreases.

63. (Amended) An article comprising:  
a substrate; and  
a layer disposed over the substrate, the layer comprising a highly tetrahedral amorphous carbon having more than about 15%  $sp^3$  carbon-carbon bonds and a carbon bonding pattern being free from a D-peak Raman spectrum;  
wherein a percentage of  $sp^3$  carbon-carbon bonds in the layer increases as a layer thickness decreases.